DECEMBER 5, 1983

IRON AGE

THE MAGAZINE FOR METAL PRODUCING MANAGEMENT

World Ste
in Figures
1983

INSIDE J&L'S REVAMPED CAMPBELL WORKS

TWO COMPANIES GO BACK TO BASICS IN MAKING STAINLESS

REPORT FROM VIENNA

A LOOK AT STEEL IN 1990

VOL. 226, NO. 29

IRON AGE

DECEMBER 5, 1983

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Third annual Scrapbook of American Business Humor

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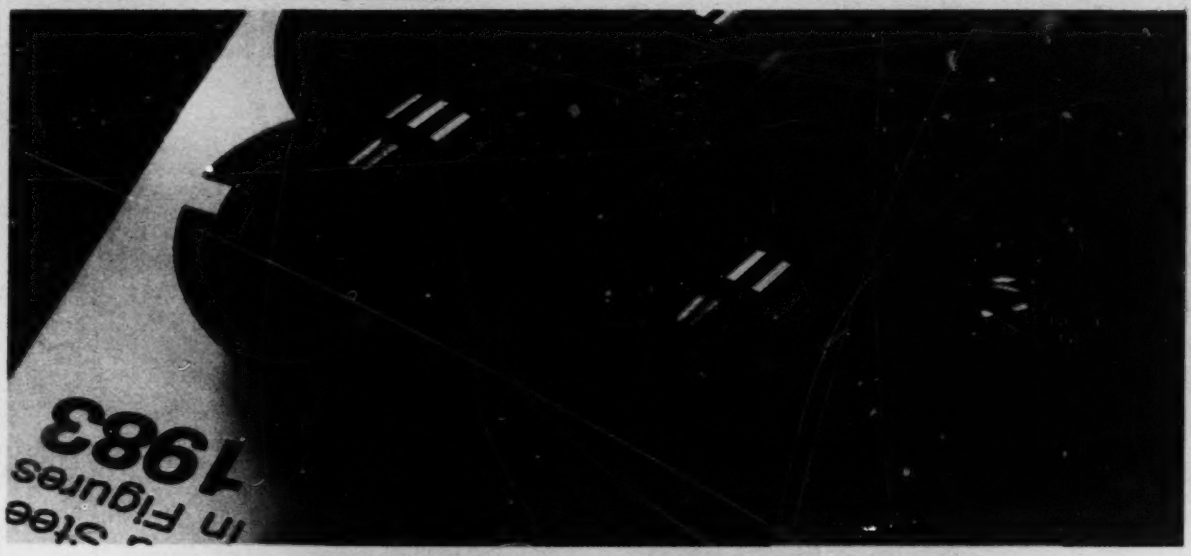


VIENNA REPORT: STEEL IN 1990

Don't count on less trade friction. Look for more slab exports and expansion from Third World, say world steel leaders at IISI meeting.

BY GENE BEAUDET

What will the world steel industry be like in the 1990's?

Given the chaotic conditions in the world steel market, forecasting even the short-term future can be a risky business.

But some glimpses of the future, and the hopes and fears that go along with it, were voiced in abundance at the seventeenth annual meeting of the International Iron & Steel Institute in Vienna in early October.

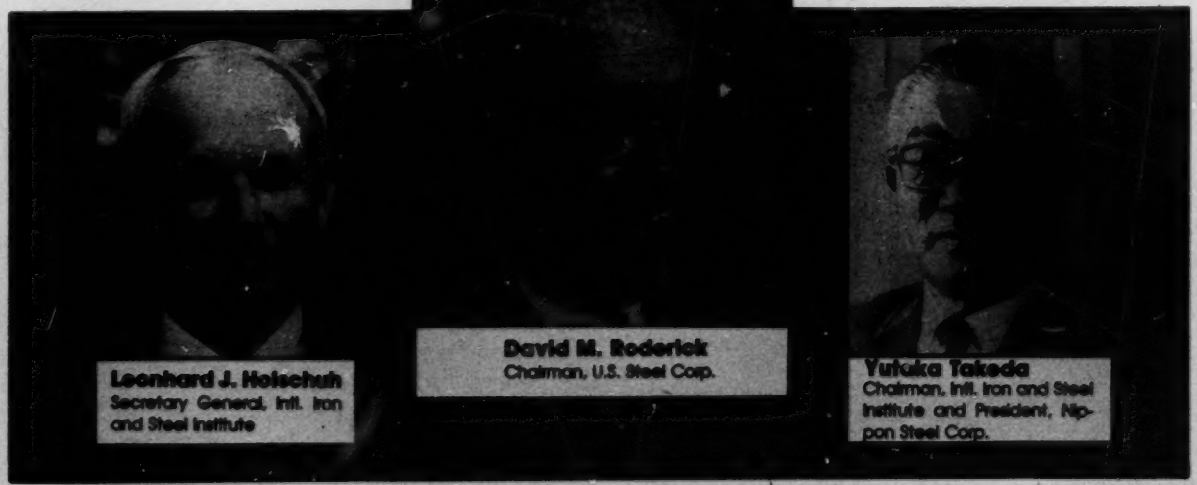
For example:

Will there be more trade friction among steel producing nations in the years ahead?

Yes, indeed.

Yes, indeed, as industrialized nations try to hold on to their domestic markets and their traditional markets overseas. And yes indeed as developing nations try to find outlets for steel that they can't absorb at home.

In September, for example, Third World imports accounted for 42 pct of the amount of steel imported by the



Leonhard J. Holschuh
Secretary General, Intl. Iron and Steel Institute

David M. Roderick
Chairman, U.S. Steel Corp.

Yutaka Takeda
Chairman, Intl. Iron and Steel Institute and President, Nippon Steel Corp.

What the Future Holds

The data opposite was prepared by the General Secretariat of the IISI and included in the Secretary General's report to the membership.

Mr. Holschuh is quick to point out that these are not steel industry figures, but rather the views of the Secretariat. Still, the figures are worth more than a passing glance.

Note that the United States is expected to increase its apparent steel consumption next year by 12.2 pct over 1983. Since the U.S. is the largest steel consumer in the free world, it's no wonder many more non-Americans at the meeting remarked, "We are all waiting for the U.S. economy to revive."

The longer view, though, is something else again.

Though by 1990, apparent steel consumption by North America, the European community and Japan is expected to trail off a bit. For all industrialized countries consumption will take a good-sized drop of 5 pct from 365 million metric tons to 346 million. How will this be made up? With lighter weight steels, non-metallic materials or imports?

But look at the steel consumption growth in developing countries! It will jump from 98 million to 137 million metric tons in just ten years.

This could help relieve the pressure from increased Third World capacity.

The most revealing of all the tables, though, is the one estimating the amount of liquid steelmaking capacity in the Western-aligned countries from 1974 to 1980.

Both Western Europe and North America are headed for big declines. Some of this is taking place now, but obviously there will be more to come.

As for Japan, only a slight capacity decline is expected from 1980 to 1990. But in an informal interview at the IISI meeting, Mr. Takeda, president of Nippon Steel, suggested that the drops in his country's capacity could be more than that.

But the big shocker in this table is the quadrupling of developing countries' growth from 1974 to 1990, and, even more significant, the more than doubling of growth in capacity from 1980 to 1990.

This should keep Western steel producers looking over their shoulders and to their government for assistance for the next six years.

Apparent Steel Consumption

	million metric tons		Pct Change
	1983E	1984	1984/83
EEC	89	93	+ 4.5
Other Western Europe	31	31	—
USA	98	110	+12.2
Japan	66	67	+ 1.5
Other Industrial countries	21	25	+19.0
Total	305	326	+ 6.9

	million metric tons		Pct Change
	1983E	1984	1984/83
Western World Industrial countries	305	326	+ 6.9
Developing countries	89	92	+ 3.4
Total	394	418	+ 6.1
COMECON	206	206	—
China and North Korea	53	53	—
World Total	653	677	+ 3.7

	million metric tons		
	1980	1985	1990
North America	132	130	127
EEC	108	100	96
Japan	79	73	73
Other Industrial countries	46	47	50
Total Industrial countries	365	350	346

	million metric tons		
	1980	1985	1990
Industrial countries	365	350	346
Developing countries	98	112	137
Total Western World	463	462	483
COMECON, China and North Korea	256	263	275
Total World	719	725	758

	million metric tons		Pct growth rate per annum
	1985	1990	
Industrial countries	350	346	− 0.2
Developing countries	112	137	+ 4.1
Total Western World	462	483	+ 0.9
COMECON, China and North Korea	263	275	+ 1.0
Total World	725	758	+ 0.9

Western World Liquid Steelmaking Capacity

	million metric tons		
	1974	1980	1990
Western Europe	203	223	175/192
North America	156	152	128/146
Japan	126	142	140
Developing countries	33	60	112
Others	15	18	20
Total	533	595	575/610

Source: IISI

U.S.—just about the combined shipments of Japan and Europe into the U.S. market.

This prompted a quick reaction from American producers to petition the U.S. government to limit this new flood of steel imports.

But will these kinds of actions here and in other industrialized nations be enough, or even work in the longer term?

Even though the U.S. quotas on carbon steels and tariffs in specialty steels from Europe are in place; and even though Yutaka Takeda, incoming chairman of the IISI and president of Nippon Steel Co., said at the meeting that his country will "maintain the practice of voluntarily limiting steel shipments to the U.S. and elsewhere," circumstances can and do change.

At the base of the problem is the world overcapacity in steel, the need to keep workers employed and the need to get U.S. dollars.

This turmoil in world steel trade prompted Leonard J. Holschuh, secretary general of the IISI, to say in his annual report to the members:

"A new consensus in the organization of international trade should be sought, as there is hardly any possibility of altering the economic and social systems, which, in international trade lead to tensions. . ."

Trade friction was not the only question seeking answers at the IISI meeting, though.

Will there be more steel mergers, acquisitions, and capacity reductions in the years ahead?

The answer to this one is easy. Yes.

Big cutbacks have been made in the United States, Great Britain, France and Germany through the merger route or downright shutdowns. Japan is forecast to cut back less. As for Third World nations, all systems still seem to be on go, or at least on hold.

General support for the scenario was given by David R. Roderick, chairman of United States Steel Corp., who said that he expects more consolidations and divestitures among U.S. and major

Yesterday, Today and Tomorrow

Needless to say, any IISI conference in Vienna would not be complete without a visit to the nearby Linz plant of Voest-Alpine, AG.

For, at this plant site, one can see or learn about important steel developments of the past, the present and the future.

It was here that the first large scale LD steel plant was put into operation in 1952. At the time, its 30-ton capacity was not considered by many as sufficient to warrant wide scale applications.

Since then, though, the LD oxygen process has grown in size and technological advancements. Today, about 50 pct of the world's steel production is produced by the LD process. The plant has been idle since 1972 and has been made into a permanent exhibit.

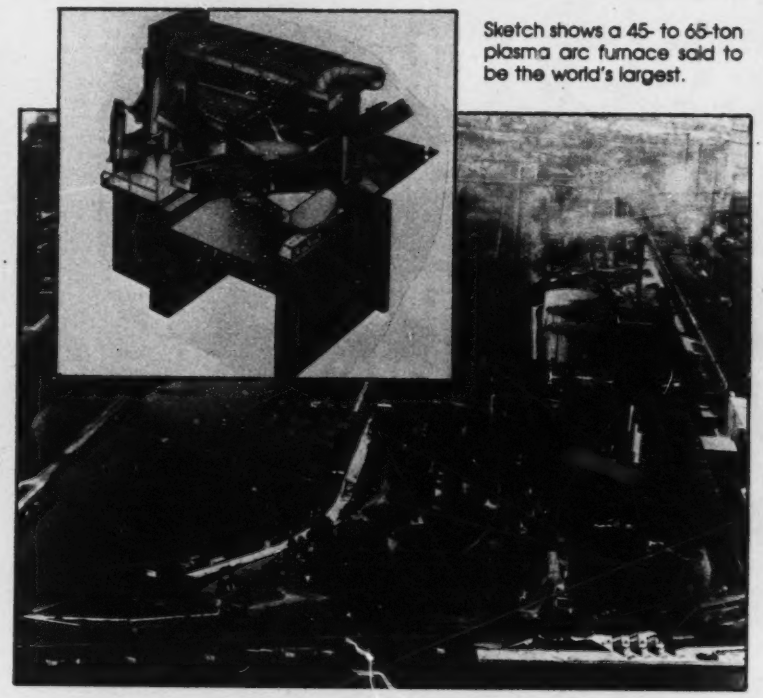
Standing next to it on the converter charging platform, though, is Voest-Alpine's most recent technical advance—a 45- to 65-ton per hour plasma furnace capable of producing a variety of steel grades.

The furnace was scheduled for production in late October and is claimed to be the largest of its kind in the world.

It is said to offer an alternative to induction and electric arc furnaces for the production of unalloyed, alloyed and special alloy steels. Among the advantages cited for the plasma furnace are no electrodes, high yields and low noise levels.

But, what does Voest-Alpine have coming up?

Well, one development is a new rolling mill plant concept that is said to bridge the gap between the semi-continuous hot strip mill and the Steckel mill.



Sketch shows a 45- to 65-ton plasma arc furnace said to be the world's largest.

The new approach is the hot strip reversing concept (HSRC) mill. It is modular and can serve as the final processing plant in a mini-mill or can compete with semi-continuous hot strip mills.

The rolling technique used is based on the principle of alternating single or tandem rolling. Initial passes are rolled on stand No. 1, while stand No. 2 remains open. Tandem operation is applied for the intermediate passes on stands No. 1 and 2. Rolling of the finishing passes is on stand No. 2 while stand No. 1 is open. During finishing passes, the material to be rolled is stored on coilers with heated mandrels.

Besides the compact arrangement of roughing and finishing stand, a number of other technical features are included in the HSRC mill concept: Crop shear, induction strip heating, roller table insulation and tensiometer roller.

Due to the compact stand arrangement, there are three important advantages of the HSRC mill compared with the Steckel mill:

—The reduction of length of the entire mill is about 30 pct, which means lower investment costs;

—there is an increase in rolling capcity as a result of tandem passes and higher rolling speeds, and

—a higher temperature is maintained during rolling due to tandem operation and higher rolling speeds.

world steel producers in the future.

And, in his remarks to the IISI members, Chairman Takeda said, "... the rationalization of steel industries and the strengthening of their financial positions have become tasks of national importance in all Western countries. Steel producers in the Western World are now looking frantically to revitalize their industries and Japan is no exception."

The third big question at the IISI meeting was:

"Will steel producers in underdeveloped nations be shipping more semi-finished steel for finishing by steelmakers in developed countries."

There was little argument about this one. American producers have already purchased some slabs from abroad. And Mr. Roderick says his company is continuing its efforts to buy some 3 million tons of steel yearly from the British Steel corp.

And at the meeting, itself, semi-finished producers were actively looking for buyers of their products. In addition to BSC, South Africa's Iscor and Brazilian firms were trying to line up orders on the spot.

Those in favor of slab imports talked about the energy savings they would gain and the greater profits they would make on adding greater value to a lower grade product.

But there were those who warned that a country could only go so far in dropping semi-finished lines and plants. In times of a ntional emergency the basic producing units must be there to support production of finished goods.

All in all though, the world steel industry as seen from Vienna could not be in worse shape. But IISI Chairman Takeda hit the proper note when he said, "This, however, should not lead us to think ... that steel is a declining industry. We must not forget that steel is an important basic industry without which countless other industries could not survive." □

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HOW COMPANIES ARE PUTTING WASTE OIL BACK TO WORK

While Japan recycles 70 pct of its lubricants, and West Germany does even better, the U.S. lags far behind with 18 pct back in use.

BY KEITH W. BENNETT

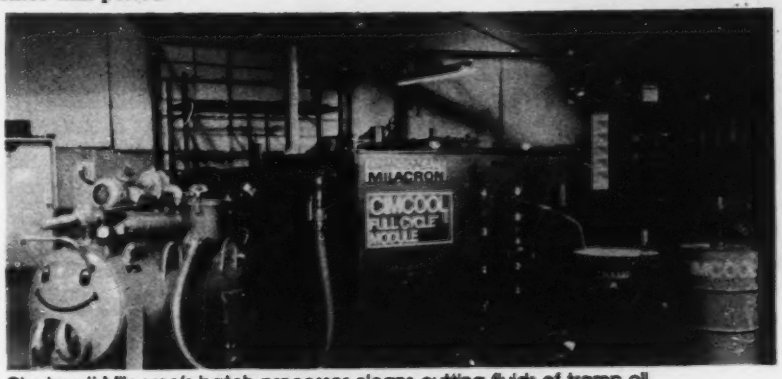
You'd never know there'd been an oil shortage. Americans use two billion gallons a year of lubricating oils and grease. Only 100 million gallons of this is recovered by recycling and re-refining. By contrast Japan recycles 70 pct of its lubricants. West Germany, supposedly, does an even better job of putting its "waste" oil back to work.

Before the oil crisis, and the subsequent oil glut, we did a bigger job. James McBain, executive director of the Association of Petroleum Re-refiners, (APR) recalls there were 150 companies recyling 300 million gallons of lubricants per year back in the 1960's—18 pct of all lubricants in use.

Now, the bulk of re-refining is done by only 13 companies, though the APR has 80 member companies, from large to small. "It appears that a recovery may have begun about two years ago," Mr. McBain says, noting eight or more new recyling plants have been set up since that period.

A full-scale oil re-refining plant can cost from $5 million to $20 million, industry sources say. And since the re-refining and recycling industry has been pinned between low virgin oil prices,

(Cont. on p. 64)



Cincinnati Milacron's batch processor cleans cutting fluids of tramp oil.

WASTE OIL COLLECTED, 1978

	Sales of New Oil 1978 (1,000 gallons)	Estimated Collection Percentage (Estimated)	Estimated Collection Volume (1,000 gallons)
Automotive lubricants (retail sales)	642,280	22.8	146,400
Truck & fleet (commercial sales)	448,440	55.0	246,600
Transmission Fluid	217,000	12.5	27,100
Gear lubricants (automotive)	45,244	33.3	15,100
Gear lubricants (industrial)	50,500	40.0	20,200
Railway diesel	51,300	18.9	9,700
Marine engine oils	35,500	24.0	5,700
Gas engine oils	41,500	2.9	1,200
Hydraulic oils	234,000	40.0	93,600
Turbine oils	84,000	60.0	50,400
Metalworking oils			
Cutting & grinding oils	64,000	20.0	12,800
Rolling & stamping oils	17,600	40.0	7,000
Quenching & tempering oils	7,500	50.0	3,700
Rust preventatives	8,500	Nil	0
Transformer oils	98,000	Nil	0
Miscellaneous	97,800	30.0	29,340
TOTAL	2,143,164	31.4	668,840

Source: Department of Energy Report prepared by Richard J. Bigda & Associates.

Rerefining Processes—The Advantages and Disadvantages

Process	Implementation	Product Quality	Process Yield	Process Energy Requirements	Process Complexity	Hazardous Waste	Additional Advantages
Acid Clay	EPA restrictions closed or forced changes in most facilities.	Can produce a quality lube oil. SF oils may be a problem	Low 65 pct when processing used automotive lube oils.	Low 12,000 Btu per gallon of product.	Simple, and readily adaptable to small volumes & batch operations.	Generates hazardous waste.	Suited to small installations with regional disposition.
Clay	Most widely used.	Questionable for highly contaminated oils acceptable for industrial oils.	Low 60 pct for automotive lubes and high 90 pct for industrial oils.	Same as acid-clay 12,000 Btu per gal. of product.	Very simple.	Generates hazardous waste.	Mostly used for pretreatment of used oil to be burned.
Caustic-Clay	Limited use, only one plant known to exist and produces automotive lube oil.	Although thought questionable for highly contaminated oils, production of a quality lube oil is claimed.	Low lube oil yield 62 pct offset by concurrent production of fuel oil, 16 pct.	About 40 pct higher than acid-clay 17,000 Btu per gallon of product if all energy is charged to lube production.	Comparable to acid-clay processes.	Generates hazardous waste.	Similar to acid-clay.
Distillation Clay (RTI)	Most widely used.	Can produce good quality lube oil.	Higher than acid-clay, 75 pct.	13,000 Btu per gallon of product.	Moderate, simpler than Distillation Hydrotreating.	Will remove most classes.	Can be retrofitted to existing facilities. Simpler than other new technologies.
Propane Extraction (IFP Process)	Newly developed process with two European plants in production.	Can produce a quality product.	Despite a high yield of 82 pct claimed by process developer, a moderate yield of 70 pct is reported by plant operators to date.	Very high, more than twice as much as clay or up to 32,000 Btu per gallon of product.	Relatively complex & suited to large-scale operations.	Generates hazardous waste.	Produces good quality oil.
Distillation Hydro- (KTI)	Only one plant is currently under construction is West Germany and no U.S. installations is reported to date.	Should be capable of producing a quality lube oil.	Significantly higher than acid-clay, 76 pct.	Slightly higher than for acid-clay 13,000 Btu per gallon of product.	Somewhat complex & suited to large-scale continuous operations.	Will remove most classes of hazardous waste.	Simpler than other newer technologies.
BETC ST/D	Pilot plant operation has produced rerefined oil for engine sequence & field tests.	Producing high quality oil that passed all engine sequence tests for an SE oil rating (the commercial spec).	Higher than acid-clay, 75 pct.	20,000 Btu per gallon of product.	Relatively complex.	Will remove most classes of hazardous waste.	Possible to retrofit to a degree into existing acid-clay or virgin petroleum.
Phillips Rerefined oil (PROP)	Pilot test completed. two commercial size plants are NC and Canada.	Met Military (MIL-L-46152A) specification requirements for administrative fleet usage.	75-80 pct	Not available	Similar in complexity to distillation hydrotreating BETC.	Will remove some classes of hazardous waste.	Turn key plant. Big oil, backing.
MZF Solvent	Lab test tube stage. Process evaluation based on this data. Has least development work of all the processes reported.	Lab date reports good removal of metallic contaminants which should produce quality lube-oil after undergoing subsequent fractionation and clay contacting.	Significantly higher than acid-clay process, 76 pct.	Greater than twice as much as acid-clay up to 25,000 Btu per gallon of product.	Should be comparable solvent extraction processes and suited for semi-continuous or batch operations.	Unknown	Insufficient information.

Source: Department of Energy

and a surprisingly strong demand for used lube oils (a lot of gallons are still used as fuel, after some clean-up).

So, why would corporations put up big ticket money for a stake in what seems—at first glance—to be a declining industry.

Richard Bigda, head of Bigda Associates, Tulsa, Okla., says "A recycler (of used lube oils) must pay the same price for waste oil as a buyer who merely wants to use it for fuel, and can't sell it for much over 80¢ per gal."

He adds, "The EPA has been talking about fuel oil restrictions by 1985. And some states, like Oklahoma and New Jersey and Illinois, have already restricted waste oil use as a fuel. There's also a rise in internal reprocessing of waste oil by U.S. manufacturing companies. They want to eliminate the problem of disposal of waste oil, about as much as they want to cut their total oil bill."

Heat treaters, he notes, already typically treat their own quench oil for reuse.

Like the shrinkage in the number of foundries in the U.S. in the early 1970's, the drop from 150 oil recycling companies to maybe half that number; represented a heavy fallout of smaller companies. They used the acid-clay oil reclamation process, which itself ran into environmental trouble in disposing of its waste.

Says Dennis Brinkman, senior chemist with the National Institute for Petroleum and Energy Research, "Now, there are a lot of new technologies. A new industry is emerging. We see fewer, but larger companies. There are more large plants in the planning stages. It takes about two years to get a (re-refining) plant onstream; due mainly to the slowness of getting 'government approval.' "

"Most re-refiners have no trouble selling their output. Often the oil reclaiming plants launder oil in a closed loop, with a big plant sending them its coolant and hydraulic or cutting oils, taking them back when the oils are recleaned," Mr. Brinkman says.

Dr. Jerome Collins, U.S. Department of Energy (DOE) adds, "There's competition to get waste oil. Buyers who use the waste oil for fuel can boost the price, making the cost ratio tougher for the re-refiners."

"There's a lot of re-refining and reclaiming. In fact, it's surprisingly busy right now. Companies still have waste oil and they have to do something with it, though it means someone has to market it, and even reformulate it," says Dennis Reed, sales engineer with Polar, Inc., Dayton, Ohio, and an officer of the recycling committee of the American Society of Lubricating Engineers.

Re-refiners, who strip the oil back to its basic condition, supply mainly hydraulic oil or motor oil markets, he believes. Reclaimers, which are usually smaller companies, clean up oil that can be used in coolants for machine tools. The bottom grades of waste oil end up in asphalt or heating fuel, though even these users are going to require more cleaning. Both kinds of recycling companies can make a broad product range.

Polar, Inc., itself markets virgin oil, re-refined oil, and reclaimed oil; though in recent years virgin oil prices fell to low points squeezing the re-refiner or reclaimer who usually sells at more than 10¢ a gallon under virgin oil prices.

The bulk of recycling is done by only 13 companies, though APR has 80 firms.

Mr. Kimball Morris of CAM-OR, Inc., heads a company that is completing a rebuild of former acid-clay reclaiming plant for used oil, into a re-refining plant using vacuum distillation to get 10 million gallons of re-refined oil per year.

Wave of New Plants

A grassroots plant would have cost $6 million or more. Rebuilding an older plant cost only $2.5 million, Mr. Morris notes. With 10 million annual gallons of re-refined oil from this plant, and 20 million gallons from its present re-refining plant at Westville, Ind., CAM-OR is one of the biggest of the re-refining facilities. A former APR president, Mr. Morris surmizes there are now 20 re-refining plants in the U.S., including the wave of new plants of the past two years.

"Re-refining has come a long way in a short time. Over the past five years our industry spent double the amount on research it spent in the previous 50 years."

Building now seems difficult, when oil prices are still soft.

"We wanted the newer technology. It allows us to produce high quality product, like motor oil, and that's kept us busy despite the industrial oil slump," says Mr. Morris.

With its own truck fleet, CAM-OR contracts directly with auto and steel and non-ferrous plants to remove and process their used oil. From full operations starting in 1980 and generating $8.5 million a year, CAM-OR probably hit over $18 million last year, industry sources say. This year, however despite the slow recovery in some parts of the economy, CAM-OR has been running full out. Growing businesses, and stringent quality demands, make lab and test equipment, and computers a big annual outlay, Mr. Morris says.

George Booth III, president of Booth Oil Co., Buffalo, NY, puts the cost of his company's new re-refining five million gallon plant at about $4.5 million. "For some of us, a new plant is the only logical choice for the long run. We closed an old acid-clay (reclamining) plant and built this new one for re-refining, because we saw re-refining as getting the bst long range results, including rate of return."

Booth Oil began as a reclaimer in 1922. By World War II it was supplying high quality aircraft engine oil. Caught in the decline of the used oil processing industry, it began to turn to a new technology; and now to the thin-film evaporator process for re-refining, which takes used oil down to its original chemical base.

The thin film evaporator is the heart of a re-refinery, but there's a lot more equipment so that the full plant looks like an oil cracking plant.

Booth Oil has the ability to pull about 95 pct of recoverable oil from the waste oil it takes in, to remarket oil for a full range of auto and industrial use and down to low-grade fuel as part of asphalt.

Industrial Petroleum Specialties, Inc., Ferndale, Mich., an oil reclaimer, treates used oils with alkaline chemicals, heat and a clay filter press.

"This was a 41-year-oil company, bought three years ago making only fuels, and now a full reclaimer, as well as a non-hazardous waste facility," says vice president William Katzenstein.

The company's single plant serves oil users in five states, with reclaimed cutting oils, soluble oils, drawing compounds, and base oils (to custom blenders). With industrial lubricant sales slow, Industrial Petroleum has been able to expand its waste treatment, and now it's been expanding its markets into the Sun Belt from its 2 million gallon storage in the Detroit area.

Oils in Two Streams

One problem in handling cutting oils from industrial plants, Mr. Katzenstein says, is keeping the oils in two streams to keep active sulfur-bearing oils separate from inactive sulfur oils, which might be a problem in some non-ferrous uses.

Wallover Oil Co., East Liverpool Ohio, added re-refining to its blending and compounding of industrial lubricants.

"We have a plant at Strongsville now, where 75 pct of the work is re-refining. But we can still simply reclaim

FIVE-YEAR RECORD OF SAVINGS AT A STEEL MILL THROUGH THEIR USE OF PETRO-PROCESSORS TO RECYCLE HYDRAULIC OILS

1979 & 1980	Gallons Recycled	29,674		
	Est. Replacement Cost	$53,413		
	Petro Charges	$25,139		
	*Savings Realized on new oil purchases		$ 28,274	53 Pct
1981	Gallons Recycled	49,920		
	Est. Replacement Cost	$84,952		
	Petro Charges	$39,491		
	*Savings Realized on new oil purchases		$ 45,461	53 Pct
1982	Gallons Recycled	33,321		
	Est. Replacement Cost	$59,977		
	Petro Charges	$28,656		
	*Savings Realized on new oil purchases		$ 31,321	52 Pct
1983 (Sept.)	Gallons Recycled	26,600		
	Est. Replacement Cost	$46,780		
	Petro Charges	$22,876		
	*Savings Realized on new oil purchases		$ 23,904	51 Pct
	Total Gallons Recycled		135,515	
	Estimated Replacement Cost		$245,122	
	Petro Charges		$116,162	
	*Savings Realized over purchases of new oil			$128,960
	*Pct Savings over new oil purchases			52.6 Pct

used oil, removing ater and solids," says general manager George Markwardt. The company can pump out 3 million gallons of cleaned oil into auto and industrial use, from two plant sites.

One of the critical problems in a big re-refining or reclaiming plant is an adequate supply of waste oil. People still may be burning it, or even dumping it in rare cases; but the big reprocessing plants need it in quantity and on a regular basis.

"The auto companies sell (used) oil, where once they burned it or recycled it. Both steel and auto are big suppliers of oils like rolling oils, quench oils, hydraulic oils, cutting oils," Mr. Markwardt puts it. And he adds that they seem much more efficient in their use of oils, just as oil reclaimers have carefully moved away from a one-time scavenger image, to more and more product testing of lube oils, both incoming and outgoing, and adding more of their own staff specialists in oil additives.

One of the new arrivals is Ameritech Inc., dating from 1979. President William Stofey describes what Ameritech does to clean incoming industrial lubricants: "We use chemical processing and filtration to get oxidized by-products out of the oil. Then we reanalyze it, replace missing additives, and we can put up a recycling plant for about a $500,000 investment and train people in using the equipment."

> Despite the slow economic recovery, some plants have been running full out.

So, Ameritech will do recycling in a 2 million gallon per year plant, or help a customer set up his own lubricant recycling plant down to volumes as small as 500 gallons per month. It also recently bought French patent to re-refine motor oil in a solvent-extraction process. It's adding a plant of its own for mid-1984 operation.

In first quarter 1984, Mr. Stofey adds, the company will set up a recycling plant for another company, and sees this lower cost equipment helping more oil users to do their own recycling.

"Re-refiners now may recycle 4 to 6 pct of the lubricating oil used here in a year, and that's been dropping in recent years," Mr. Stofey recalls. He foresees the day when small batch machines will let even a small job shop using 10 barrels of oil do its recycling.

At least one company is planning to go into oil reclamining as a service company, using Ameritech equipment. Cold finishing mills, forgings, steel castings, die castings, heat treat, and big machining systems using lots of cutting or drawing oils or gear oils, are already customers.

Probably one of the biggest reclaimers, is Metalworking Lubricants, Inc., in the Detroit area. It has four plants in the U.S.; and three in Western Europe where it also does re-refining, points out Robert Tomlinson, vice president of sales. This company does $20 million-plus in annual sales, has plants on both coasts besides the two in the Detroit area Indianapolis. The high water content of many coolants and hydraulic fluids is a problem for reclaimers, who have to process a lot of water to recover a very small amount of saleable oil, but Metalworking Lubricants has handled fluids of only 5 pct oil content.

It also has a licensed hazardous waste site.

Metalworking Lubricants started in 1952 as supplier to a single oil company, but in 1971 began supplying a wider market, for its recycled oil. In the past two years, it's also added two supply depots to its multi-plant system.

Tough Quality Standards

"I'd say 1983 has imposed the toughest quality demands we've seen in the 20 years we've been in business," says Mr. Tomlinson. "And large customers now want almost daily deliveries, and waste has to be pulled out of their plants on a 24 hour lead time."

"The demand for capital equipment makes this business a never ending investment. We re-invest over 90 pct of our earnings, with a great rise in the past five years," Mr. Tomlinson says. Besides its plants in Europe, the company has licensees in Mexico and Taiwan.

Cincinnati Milacron Inc., which has noted the use of recycled lubricants in machining applications, also offers equipment to recycle metalworking fluids.

"We use a batch processor for indi-

vidual machine tools," says Jerry Johnson, equipment engineer at the company. "We pull fluid from the machine tool's sump and transport it to a cleaning module. We have three sizes to clean water-based coolants, soluble oils, synthetic water-based cutting fluids and semi synthetics."

The system cleans cutting fluid of tramp oil, which is removed separately; and in three following stages the fluid is automatically restored to its original mix.

Cincinnati Milacron, markets water-based metalworking fluids.

It's notable that a number of oil companies have looked at recycling company acquisitions. Recyclers report getting calls from larger companies including the virgin oil companies, who want to talk acquisition.

Phillips Petroleum Co., Inc., developed its own recycling system, PROP. This is a re-refining process using hydrogenation, rather than high refining temperatures to 600 deg. F. At any rate, Kenneth Neubauer, sales director for PROP, explains that the system doesn't need to vaporize the oil in a vacuum as is commonly done in re-refining.

A small PROP plant was installed in North Carolina, as a 2 million gallon per year unit, but was hampered by rules that it would process oil only for state vehicles, which didn't give it much of a stock of lubricants to re-refine.

Now, however, for Shell Canada Ltd., Phillips has a larger (9 million annual gallon) re-refining plant that came on in September; though apparently Canada Shell has also made modifications of its own in the multi-stage process to demetalize, filter, distill, and hydro-treat used oil coming from motor oil collection centers and factories, airlines and railways in Canada.

The cost is $23 million in Canadian dollars. Another PROP recycling plant is "in the late stages of startup", a 10 million annual gallon plant in the Mexico City region.

Kinetics Technology International, Monrovia, Calif., is at work on permits for two re-refining sites in the U.S. In an interview, Robert Krupp, group vice president, finance at KTI Corp., as it is widely known, agrees that the key problem in planning a big central plant is finding an area that will supply enough used lubricants as feedstock for the plant.

Viable Plant Sites

"We can see about 22 economically viable plant sites in the U.S.," Mr. Krupp says. "Of these, we see 10 that would ultimately be KTI plant sites. That is, we would design, engineer, and construct the plants."

Like the Booth Oil plant, these have at their heart Luwa thin film evaporator, but this one uses vacuum distillation and a hydrogen "finisher" as well. The first KTI plant was finished in July last year, took 1.5 years to build, is sited in Greece, and rated at 8.2 million gallons per year. That's a lot of used oil. It can recover 95 pct of the lube oil it receives, using some of its hydrocarbon intake for its own fuel needs, as process temperatures can go to the 1150 deg. F.

The technology began to develop as early as 1975, and an early plant—again built with an oil company—is in Germany. Notes Mr. Krupp on capital cost, "A virgin oil refinery costs $4 to $5 per gallon of output. A re-refinery costs only $2 per gallon of capacity."

Pfaudler Co., part of Sohio Corp., is also in the re-refining equipment market through the thin film evaporation route. It's worked with it since 1972, so qualifies as a veteran. Richard Pike, manager of Pfaudler's Engineered Systems Group, reports, "We have a couple of plants using our equipment that are coming on, and two complete systems overseas, though we've done both re-refining plants and reclaiming plants. We're gearing to lower working temperatures, and higher vacuums."

> Recycling waste oil is an industry of many corporate youngsters.

The smaller industrial plant that wants to rework its own lubricants on the plant premises itself, began to get help as early as 1979 from Petro-Processors, Inc., South Holland, Ill., which brings its process equipment into a steel plant or machining plant to remove water and particles from the machine tool or oil sump.

"We can process at 200 to 500 gallons per hour," says vice president Richard Siegel, "Hooking the processor right onto a press or a rolling mill while the machinery is continuing to run. It will clean and dry the fluids, but doesn't take out the additives in the oil."

Petro-Processors is a lubricant cleaner, supplying on-site service. But: "We represent several equipment builders, who can create a small volume (300 gallons per month) cleaning unit that may have an original cost of only $2000 to $3000. A bigger company, say of several thousand gallons of lubricants per week; could get a bigger cleaning plant, at a cost of $70,000 to $200,000 to handle maybe 250 to 500 gallons per hour." A cleaning system for quench tanks in a big heat treating plant would be another example.

Another on-site machine is a portable unit. Just put two hoses in a machine tool oil sump, and the machine by Renewed Energy Corp., South Bend, Ind., will boil out water and gases, at a capital cost of as little as $11,000; or a bigger machine selling at $19,900.

General Manager Raymond Nukalla of Renewed Energy, notes that the units can be fitted to a multiple spindle drilling machine while the machine operates. The cleaning machine is fully automatic. It sounds like small plant machine, but they've gone in at Ford Motor Co., at a big plastics company who uses them for injection molding machines; printing machinery builder uses them with its water soluble grinding oils at the grinding machines.

It's an industry of many corporate youngsters. Renewed Energy is just about three years old.

Luwa Corp., based at Charlotte, N.C., builds thin film evaporators that are a central unit in many re-refining oil recovery systems. Says vice president David Ruths, "Our distillation step is the heart of the most frequently used distillation method in use today." Industry sources agree on that appraisal.

Luwa is an equipment marketer, has built oil recycling systems since the 1970's, which is a reasonably long time in this young, new technology-oriented industry. Most industry members will agree with Mr. Ruths' estimate that this is no boom the industry is seeing. But there are plants coming on stream, and more are expected.

Several factors are at work that favor re-refining and oil reclaiming. The EPA is finally, beginning to move on restructions on waste oil, both in burning and in disposal. That will force oil users to take another look at recycling. Second, oil prices should rise. That always makes recycling look better. Third, old restrictions requiring a special label on recycled oil, and forbidding its use in government vehicles in some cases; are now ended. The old "scavenger" product image of recycled oil is finally laid to rest. Fourth, any kind of disposal sites are shrinking.

For the lube oil user who wants to cut his own costs, or his disposal costs, there are now a number of routes. You can put in your own recycling equipment, often at surprisingly low cost. Or, just call up a service company, and let your fingers do the recycling. □

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EFFECTIVE NOVEMBER 28, 1983

MATERIALS NEWSFRONT

Price & Production Data

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	183	192	187	141
Buffalo	9	9	9	30
Pittsburgh	210	239	223	62
Youngstown	59	87	114	43
Cleveland	138	140	137	67
Detroit	127	132	138	89
Chicago	513	513	484	290
Cincinnati	89	81	103	57
St. Louis	65	74	79	33
Southern	149	159	139	60
Western	69	74	78	43
U.S. Production	1,611	1,700	1,691	915

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports. Rail transportation, handling and unloading may be charged to the account of the buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)..... gross-ton 80.50-86.9*
Old range, non-bessemer ..... gross-ton $32.78
Mesabi, regular-unscreened ..... gross-ton $32.53
Mesabi, non-bessemer.....gross-ton $30.03-31.53**

*80.50¢—Pickands Mather as of 1/27/81.
86.9¢—U. S. Steel as of 3/15/82. Cleveland-Cliffs as of 2/26/82, Oglebay Norton as of 3/25/82, and Hanna Mining as of 2/26/82.
**Effective 8/1/83.

Steel Production, Composite Prices

(Effective November 28, 1983)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1983	To Date 1982
Net tons, in thousands	1,611	1,700	75,249	66,133
Capability Utilization Rate	55.8	58.9	55.3	47.5

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 9/1/83)	26.822	26.822	26.822	25.197
Pig Iron* * (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.* * * (Gross ton=2240 lbs.)	$ 84.50	$ 81.50	$ 79.17	$ 51.17
No. 2 bundles	$ 52.50	$ 49.17	$ 46.83	$ 38.50

Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$ 88.50	$ 84.50	$ 84.50	$ 52.50
No. 1 steel, Philadelphia	80.50	80.50	73.50	54.50
No. 1 steel, Chicago	84.50	79.50	79.50	46.50
No. 1 bundles, Detroit	81.50	81.50	83.50	41.50
Low Phos., Youngstown	84.50	84.50	84.50	52.50
No. 1 mach'y cast., Pgh.	109.50	74.50	74.50	61.50
No. 1 mach'y cast., Phila	95.50	95.50	95.50	98.50
No. 1 mach'y cast., Chi.	111.50	109.50	109.50	103.60

*Finished Steel Composite
Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
* *Pig Iron Composite
Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
* * *Steel Scrap Composite
Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Nonferrous Prices

(Effective November 28, 1983)
Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum	81.00	76.00-81.00	9/27/83
Copper (C)	68.00-69.00	67.00	11/28/83
Lead	25.00-27.00	26.00-27.00	10/27/83
Magnesium Ingot	138.00	134.00-138.00	6/1/83
Nickel	329.00	350.00	11/25/81
Titanium Sponge	555.00-585.00	555.00	4/29/82
Zinc	49.00	46.00-49.00	10/25/83

ALUMINUM: 99.5%. COPPER (C) = cathode. LEAD: common grade. MAGNESIUM: 99.8% pig, delivered. NICKEL: electro., Port Colborne, Canada. ZINC: high grade.

Antimony, American Laredo, Texas . $2.00
Beryllium-aluminum 5% Be, per lb. contained Be $215.00
Beryllium-copper, per lb. cont. Be $130.00
Beryllium 97% powder 200 ..... $178.00
Bismuth, ton lots ..... $1.80-$1.90
Cadmium, ton lots $1.25
Calcium, ton lots, crown $3.05
Chromium, 99.8% $3.75
Cobalt, 99%, cathode $12.50
Gold per troy oz. $394.24
Indium, dollars per troy oz. $3.20
Iridium, dollars per troy oz. $600
Magnesium sticks, 10,000 lbs. $1.91
Mercury, per 76-lb. f.o.b. N.Y. ..$340-$350
Molybdenum, lb. tech. moly oxides, 20 lb. MO can $5.85
Nickel oxide sinter at U.S. points of entry $3.12
Palladium, per troy oz. $140
Platinum, per troy oz. $475
Rhodium, per troy oz. $600.00
Silver ingots, per troy oz. $9.02
Vanadium $4.94
Zirconium sponge..... $12.00-$17.00
(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb, EX-SMELTER, based on daily market in Penang in Malaysian dollars per kilo.)

Nov. 21—585.16 Nov. 24—Holiday
Nov. 22—585.10 Nov. 25—584.05
Nov. 23—584.83

Scrap Prices

Brass Mill Scrap

(Cents per lb; over 20,000 lbs. add 1¢ per lb)

	Solids	Turning
Copper	66½	61
Yellow brass	56⅝	56½
Red brass	58⅝	58
Comm. bronze	59¼	58¼
Mang. bronze	59¼	57¼
Free cutting rod ends	57	56

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	60
No. 2 copper wire	50
Light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	56
No. 2 copper wire	46
Light copper	37
No. 1 composition	52
No. 1 comp. turnings	50
Hvy. yellow brass solids	32
Hvy. yellow brass turnings	28
Radiators	42

Aluminum

New mixed clips	47	—48
Old sheet	44	—45
Old cast	44	—45
Clean dry borings	44	—45

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	40	—41
Mixed L.C. clips	35	—36
Old sheets and cast	33	—34
Borings and turnings	24	—25
Duraluminum clippings	29	—30

Copper and Brass

No. 1 copper wire	50	—51
No. 2 copper wire	42	—43
Light copper	38	—39
Radiators	34	—35
No. 1 composition	43	—44
No. 1 composition turn'gs	41	—42
Cocks and faucets	29	—30
Clean heavy yellow brass	26	—27
Brass Pipe	28	—29
New soft brass clippings	42	—43

Lead

Heavy soft lead	8	— 9
Whole batteries	3	— 4
Type metal	15	—16
Electrotype	13	—14

Nickel

Nickel solids	110	—120
Nickel rod ends	110	—120
Nickel sheets, clips	110	—120
Nickel turnings	50	— 60

Zinc

New zinc clippings	15	—16
Old diecast zinc	10	—11

MATERIALS NEWSFRONT

(Effective November 28, 1983) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of *Iron Age* editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 88.00 to	$ 89.00
No. 2 hvy. melting	78.00 to	79.00
No. 1 dealer bundles	110.00 to	111.00
No. 1 factory bundles (auto)	113.00 to	114.00
No. 2 bundles	56.00 to	57.00
No. 1 busheling	104.00 to	105.00
Machine shop turn.	16.00 to	17.00
Shoveling turnings	46.00 to	47.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	109.00 to	110.00
Heavy turnings	78.00 to	79.00
No. 1 RR hvy. melting	106.00 to	107.00
Rails 2 ft. and under	111.00 to	112.00
Scrap rails, random lgth.	99.00 to	100.00
RR specialties	109.00 to	110.00
No. 1 machinery cast	79.00 to	80.00
Cupola cast	72.00 to	73.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	600.00 to	610.00
18-8 turnings	500.00 to	510.00

Chicago

No. 1 hvy. melting	$ 84.00 to	$ 85.00
No. 2 hvy. melting	77.00 to	78.00
No. 1 dealer bundles	109.00 to	110.00
No. 1 factory bundles (auto)	111.00 to	112.00
No. 2 dealer bundles	49.00 to	50.00
No. 1 busheling	102.00 to	103.00
Shredder scrap	88.00 to	89.00
Machine shop turn.	37.00 to	38.00
Mixed bor. and turn.	39.00 to	40.00
Shoveling turnings	44.00 to	45.00
Cast iron borings	53.00 to	54.00
Low phos. forge crop	106.00 to	107.00
Low phos. punchings plate ¼ in. and heavier	119.00 to	120.00
Low phos. 2 ft. and under	114.00 to	115.00
No. 1 RR hvy. melting	100.00 to	101.00
Scrap rails, random lgth.	93.00 to	94.00
Reroller rails	108.00 to	109.00
Rails, 2 ft. and under	112.00 to	113.00
RR couplers and knuckles	98.00 to	99.00
RR car axles	124.00 to	125.00
No. 1 machinery cast	111.00 to	112.00
Cupola cast	99.00 to	100.00
Stove plate	100.00 to	101.00
Steel car wheels	108.00 to	109.00
Stainless		
18-8 bundles and solids	560.00 to	570.00
18-8 turnings	460.00 to	470.00
430 bundles and solids	135.00 to	140.00
430 turnings	100.00 to	105.00

Philadelphia

No. 1 hvy. melting	$ 79.00 to	$ 82.00
No. 2 hvy. melting	67.00 to	70.00
No. 1 dealer bundles	94.00 to	97.00
No. 2 dealer bundles	50.00 to	53.00
No. 1 busheling	94.00 to	97.00
Shredder scrap	91.00 to	94.00
Machine shop turn.	26.00 to	29.00
Mixed bor. and turn.	26.00 to	29.00
Shoveling turnings	44.00 to	47.00
Low phos. 5 ft. and under	92.00 to	95.00
Low phos. 2 ft. punchings	101.00 to	104.00
Electric furnace bundles	108.00 to	111.00
RR specialties	93.00 to	96.00
Rails, 2 ft. and under	106.00 to	109.00
Cupola cast	65.00 to	68.00
Heavy breakable cast	53.00 to	56.00
No. 1 machinery cast	94.00 to	97.00

Detroit

Broker buying prices per gross ton on cars:

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	57.00 to	58.00
No. 1 dealer bundles	81.00 to	82.00
No. 2 bundles	40.00 to	41.00
No. 1 busheling	80.00 to	81.00
Drop forge flashings	55.00 to	56.00
Machine shop turn.	31.00 to	32.00
Mixed borings and turn.	20.00 to	21.00
Shoveling turnings	31.00 to	32.00
Cast iron borings	34.00 to	35.00
Heavy breakable cast	35.00 to	36.00
Mixed cupola cast	51.00 to	52.00
Automobile cast	74.00 to	75.00
Stainless		
18-8 bundles and solids	470.00 to	480.00
18-8 turnings	350.00 to	360.00
430 bundles and solids	115.00 to	125.00

Youngstown

No. 1 hvy. melting	$ 73.00 to	$ 76.00
No. 2 hvy. melting	51.00 to	54.00
No. 1 dealer bundles	87.00 to	90.00
No. 2 dealer bundles	37.00 to	40.00
Machine shop turn.	14.00 to	17.00
Shoveling turnings	19.00 to	22.00
Low phos. plate	83.00 to	86.00
Electric furnace bundles	78.00 to	81.00
Galvanized bundles	72.00 to	75.00

Cleveland

No. 1 hvy. melting	$ 69.00 to	$ 72.00
No. 2 hvy. melting	34.00 to	37.00
No. 1 dealer bundles	87.00 to	90.00
No. 1 factory bundles	100.00 to	103.00
No. 2 bundles	23.00 to	27.00
No. 1 busheling	86.00 to	89.00
Machine shop turn.	12.00 to	15.00
Mixed bor. and turn.	12.00 to	15.00
Shoveling turnings	14.00 to	17.00
Cast iron borings	17.00 to	20.00
Cut structural & plates, 2 ft. and under	102.00 to	105.00
Low phos. punchings plate	102.00 to	105.00
Drop forge flashings	42.00 to	45.00
Foundry steel, 2 ft. & under	59.00 to	62.00
No. 1 RR hvy melting	87.00 to	90.00
Rails, 2 ft. and under	112.00 to	115.00
Rails, 18 in. and under	113.00 to	116.00
Steel axle turnings	67.00 to	70.00
Railroad cast	94.00 to	97.00
No. 1 machinery cast	97.00 to	100.00
Cupola cast	63.00 to	66.00
Stove plate	48.00 to	51.00
Stainless		
18-8 bundles	375.00 to	385.00
18-8 turnings	325.00 to	335.00
430 bundles	80.00 to	85.00

Buffalo

Broker buying prices per gross ton on cars:

No. 1 hvy. melting	$ 68.00 to	$ 69.00
No. 2 hvy. melting	51.00 to	53.00
No. 1 busheling	79.00 to	80.00
No. 1 dealer bundles	79.00 to	80.00
No. 2 bundles	35.00 to	36.00
Machine shop turn.	15.00 to	16.00
Mixed bor. and turn.	13.00 to	14.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	15.00 to	16.00
Low phos. plate	79.00 to	80.00
Structural and plate, 2 ft. and under	84.00 to	85.00
Rails, 2 ft. and under	89.00 to	90.00
Scrap rails, random lgth.	74.00 to	75.00
No. 1 machinery cast	84.00 to	85.00
No. 1 cupola cast	64.00 to	65.00

St. Louis

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	61.00 to	62.00
Foundry steel, 2 ft.	61.00 to	62.00
No. 1 dealer bundles	72.00 to	73.00
No. 2 bundles	58.00 to	59.00
Machine shop turn.	20.00 to	21.00
Shoveling turnings	27.00 to	28.00
Cast iron borings	38.00 to	39.00
No. 1 RR hvy. melting	81.00 to	82.00
Rails, random length	78.00 to	79.00
Rails, 18 in. and under	94.00 to	95.00
RR specialties	87.00 to	88.00
Cupola cast	70.00 to	71.00
Heavy breakable cast	48.00 to	49.00
Stove plate	75.00 to	76.00
Cast iron car wheels	49.00 to	50.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	57.00 to	58.00

Birmingham

No. 1 heavy melting	$ 70.00 to	$ 71.00
No. 2 heavy melting	66.00 to	67.00
No. 1 dealer bundles	72.00 to	73.00
No. 2 bundles	52.00 to	53.00
No. 1 busheling	72.00 to	73.00
Shredder scrap	94.00 to	95.00
Machine shop. turn.	24.00 to	25.00
Shoveling turnings	32.00 to	33.00
Cast iron borings	33.00 to	34.00
Electric furnace bundles	67.00 to	68.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	97.00 to	98.00
Structural and plate, 4 ft.	92.00 to	93.00
No. 1 RR hvy. melting	94.00 to	95.00
Scrap rails, random lgth.	88.00 to	89.00
Rails, 18 in. and under	100.00 to	101.00
Angles and splice bars	94.00 to	95.00
No. 1 cupola cast	87.00 to	88.00
Unstripped motor blocks	69.00 to	70.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 66.00 to	$ 67.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 dealer bundles	76.00 to	77.00
No. 2 bundles	33.00 to	34.00
Machine shop turn.	11.00 to	12.00
Shoveling turnings	13.00 to	14.00
Cast iron borings	18.00 to	19.00
Low phos. 18 in. and under	95.00 to	96.00
Rails, random length	74.00 to	75.00
Rails, 2 ft. and under	92.00 to	93.00
No. 1 cupola cast	70.00 to	71.00
Heavy breakable cast	36.00 to	37.00
Drop broken cast	84.00 to	85.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 40.00 to	$ 45.00
No. 2 hvy. melting	37.00 to	40.00
No. 2 dealer bundles	23.00 to	27.00
Mixed bor. and turn.	11.00 to	13.00
Machine shop turn.	6.00 to	7.00
Shoveling turnings	14.00 to	15.00
Clean cast. chem. borings	35.00 to	36.00
No. 1 machinery cast	89.00 to	90.00
Mixed yard cast	45.00 to	46.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	490.00 to	510.00
18-8 turnings	390.00 to	410.00
430 prepared solids	70.00 to	80.00
410 solids	60.00 to	70.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 50.00 to	$ 52.00
No. 2 hvy. melting	40.00 to	42.00
No. 1 dealer bundles	68.00 to	70.00
No. 2 bundles	33.00 to	35.00
No. 1 busheling	68.00 to	70.00
Shredder scrap	68.00 to	70.00
Machine shop turn.	8.00 to	10.00
Shoveling turnings	13.00 to	15.00
No. 1 machinery cast	90.00 to	95.00
Mixed cupola cast	40.00 to	42.00
Heavy breakable cast	10.00 to	12.00

San Francisco

No. 1 hvy. melting	$ 44.00 to	$ 46.00
No. 2 hvy. melting	36.00 to	38.00
No. 1 dealer bundles	29.00 to	31.00
No. 2 dealer bundles	13.00 to	15.00
Machine shop turn.	6.00 to	8.00
Cast iron borings	6.00 to	8.00
No. 1 cupola cast	73.00 to	75.00

Los Angeles

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	29.00 to	31.00
No. 1 dealer bundles	27.00 to	29.00
No. 2 dealer bundles	10.00 to	12.00
Machine shop turn.	6.00 to	8.00
Shoveling turnings	10.00 to	12.00
Cast iron borings	6.00 to	8.00
Elec. furnace, 1 ft. and under (foundry)	73.00 to	75.00
No. 1 cupola cast	75.00 to	77.00

Seattle

No. 1 hvy. melting	$ 61.00 to	$ 63.00
No. 2 hvy. melting	50.00 to	52.00
No. 2 bundles	40.00 to	42.00
No. 1 cupola cast	96.00 to	98.00
Mixed yard cast	83.00 to	85.00

Hamilton, Ont.

Brokers buying price per net ton on cars:

No. 1 heavy melting	$ 65.00
No. 2 heavy melting cut 2 ft. and under	62.00
No. 1 dealer bundles	70.00
No. 2 bundles	38.00
Mixed steel scrap	44.00
Bush. new fact. prep'd.	68.00
Bush. new fact. unprp'd.	60.00
Machine shop turn.	33.00
Short steel turn.	36.00
Mixed bor. and turn.	23.00
Cast scrap	58.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 79.00 to	$ 80.00
No. 2 hvy. melting	63.00 to	65.00
No. 2 bundles	41.00 to	43.00
Machine shop turn.	22.00 to	23.00
Crushed turnings	44.00 to	46.00
Shredder scrap	79.00 to	80.00
Cut structural plate 2 ft. and under	94.00 to	96.00
Unstripped motor blocks	57.00 to	59.00
Cupola cast	78.00 to	80.00

STEEL PRICES

Producer Key
With Principal Offices

A4 American Cladmetals Co., Carnegie, Pa.
A7 Armco Inc., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A11 Atlantic Wire Co., Branford, Conn.

B1 Baron Drawn Steel Corp., Toledo, Ohio
B3 Bethlehem Steel Corp., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin Steel Co., Harvey, Ill.

C1 Calstrip Corp., Los Angeles
C6 CF&I Steel Corp., Pueblo, Colo.
C10 Copperweld Steel Co., Warren, Ohio
C11 Crucible Divisions, Colt Industries, Pittsburgh, Pa.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Co., Birmingham, Ala.
C20 Calumet Steel Div., Chicago Heights, Ill.
C21 Cumberland Steel Co., Cumberland, Md.

D1 Detroit Strip Div., Cyclops Corp.
D2 Driver Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.

E3 Enamel Products & Plating Co., McKeesport, Pa.
E4 Elliot Bros. Steel Co., New Castle, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Division, National Steel Corp., Ecorse, Mich.
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.
G6 Gibraltar Steel Corp., Buffalo, N. Y.
G7 Georgetown Steel Corp., Georgetown, S. C.
G8 Guterl Special Steel Corp.

H1 Hercules Drawn Steel Corp., Livonia, Mich.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Steel Corp., Chicago

J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif
K2 Keystone Consolidated Industries, Inc.
K3 Kentucky Electric Steel Co., Ashland, Kentucky
K5 Kemco Div., Foote Mineral Co., Keokuk, Iowa

L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
L5 Litho-Strip Corp., Chicago

M2 McLouth Steel Products Corp.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M8 Mill Strip Products Div., National Steel Service Center, National Steel Corp.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M11 Midwest Steel Div., National Steel Corp., Portage, Ind.

N1 Northeast Precision Steel Co., Boston, Mass.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle, Wash.
N9 Nelsen Steel & Wire Co., Chicago, Ill.
N10 North Star Steel Co., Saint Paul, Minnesota

O2 Oregon Steel Mills, Portland, Ore.

P2 Phoenix Steel Corp., Claymont, Del.
P9 Pacific States Steel Co., Niles, Cal
P13 Penn Dixie Steel Corp., Kokomo, Ind.
P14 Pacific Tube Co., Los Angeles
P15 Philadelphia Steel and Wire Corp., Phila.

R3 Republic Steel Corp., Cleveland
R4 Ramco Steel Co., Buffalo, N. Y.
R5 Roblin Steel Corp., Inc., North Tonawanda, N. Y.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S10 Seneca Steel Service, Buffalo, N. Y.
S16 Southern Precision Steel Co., Gulfport, Miss.

T4 Thomas Steel Strip Co., Warren, O.
T5 Timken Company, Steel Division, Canton, O.
T7 Texas Steel Co., Fort Worth, Tex.
T9 Triumph Electro Corp., Chicago, Ill.
T10 Tennessee Forging Steel Corp., Harriman, Tenn.
T11 Teledyne Columbia-Summerill, Carnegie, Pa.

U1 United States Steel Corp., Pittsburgh, Pa.

W3 Weirton Steel Division, National Steel Corp., Weirton, West Va.
W5 Wheeling-Pittsburgh Steel Corp.
W7 Wilson Steel & Wire Co., Chicago
W10 Wyckoff Steel Div., Ampco-Pittsburgh Corp., Pittsburgh, Pa.
W14 Whittaker Steel Strip Div., Detroit, Mich.

Steel Service Center Prices

Price, Dollars per 100 lb

Prices are based on list prices reported to *Iron Age* by a number of metal service centers deemed representative by *Iron Age* and then weighted based in part on the reports received each month. Prices are not intended to reflect the actual transaction prices obtained by any individual metal service center.

Cities*	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
City Delivery Charge*	Hot-Rolled (10 gage)	Cold-Rolled (20 gage)	Galvanized (16 gage)	Hot-Rolled Strip	Plates	Standard Structurals	Hot-Rolled (merchant)	Cold Finished	Hot-Rolled 8620 As Rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 8620 As Rolled	Cold-Drawn 4140 Annealed
Atlanta	23.40	30.03	31.43	31.11	22.38	22.27	17.82	31.22	38.37	50.60	69.58	73.19
Baltimore	25.09	29.89	35.62	40.13	23.60	28.11	20.19	37.78	56.15	65.06	71.57	76.32
Birmingham	19.00	31.75	32.11	31.28	21.93	24.25	17.97	30.71	49.31	68.90	68.16	74.43
Boston	28.40	32.27	35.24	45.18	32.96	30.79	21.20	34.51	49.75	57.97	66.62	73.15
Buffalo	26.29	33.95	38.37	40.89	30.94	27.55	18.16	37.91	40.10	47.82	55.33	63.40
Chicago	26.61	32.45	34.67	33.78	22.92	23.88	16.74	31.87	36.14	40.45	46.33	52.53
Cincinnati	26.32	31.88	34.49	30.09	23.18	24.34	16.65	30.75	36.03	40.33	45.58	50.75
Cleveland	26.99	32.63	35.29	33.62	32.55	26.87	16.59	31.20	35.76	39.98	44.02	50.99
Denver	33.50	39.20	38.65	40.27	31.40	31.40	20.43	44.16	45.17	59.08	66.90	72.22
Detroit	27.13	33.31	36.11	32.71	25.31	27.51	17.40	30.54	36.14	40.44	48.03	52.99
Houston	26.10	31.52	35.30	42.46	30.23	30.05	20.65	41.47	45.65	51.86	56.36	64.71
Kansas City	23.76	28.88	33.66	31.59	23.80	28.84	16.15	38.74	45.33	48.63	52.20	59.20
Los Angeles	26.97	33.40	37.56	47.04	32.50	36.17	29.04	41.14	63.36	70.46	76.95	73.22
Memphis	25.07	32.01	33.06	33.37	25.89	27.30	18.99	34.78	36.78	49.96	59.80	69.44
Milwaukee	26.87	32.57	34.90	29.89	23.09	24.27	16.19	29.96	36.12	45.51	45.23	56.34
New York	25.80	33.21	36.97	44.64	30.83	29.48	20.17	41.14	46.00	51.91	61.12	63.63
Philadelphia	27.52	33.09	37.41	39.96	29.01	28.51	19.74	38.64	46.41	53.60	63.90	70.57
Pittsburgh	29.26	35.44	37.92	41.99	32.96	29.51	20.41	32.56	46.10	53.08	60.27	68.22
Portland	25.66	33.27	38.17	31.11	31.04	34.76	27.50	44.85	49.78	57.74	70.44	....
San Francisco	27.75	34.12	38.15	46.06	33.06	35.40	27.00	39.54	60.16	71.07	78.29	85.66
Seattle	27.74	32.32	36.16	40.49	27.49	30.10	28.45	50.60	63.37	71.57	76.28	87.67
Spokane	21.00	30.34	34.26	37.91	33.00	33.75	21.60	43.01	43.20	47.52	....	58.32
St. Louis	25.72	30.66	33.84	32.25	25.17	24.38	16.92	32.84	37.68	42.41	49.84	56.46
St. Paul	25.72	29.51	32.90	36.25	26.33	24.97	17.70	32.93	36.16	41.16	45.76	52.07

Base Quantities. All HR products may be combined for quantity. Hot-rolled sheet, 10 ga x 36 x 96—120; Cold-rolled sheet, 20 ga x 36 x 120; Galv. sheet—16 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate ¼" x 64/; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds ¾-2 15/16; Cold finished bar—C 1018—1" rounds; Alloy bar—Hot-rolled 8620—1⅛" round; Cold drawn—1" round; Hot-rolled 4140—1⅛" round; Cold drawn—1" round. Check local supplier for additions or deductions from base.

*Prices at all points include metropolitan delivery charges.

STEEL PRICES

Codes identify Producers listed in the Key on page 97. (Prices quoted are mill base prices in cents per pound unless otherwise noted and do not reflect extras or surcharges.) N.A.—Not available.

Billets, Blooms, Slabs

(Dollars per net ton)

Carbon Rerolling, Midwest	
W5	$366.00
N4	$366.00
West	
C6	$346.00
Carbon Forging, East	
B3(3), C10, U1	$453.00
R3	$453.00
Midwest	
R3, U1, W5	$453.00
S1	$420.00
C10	$453.00
K2	$453.00
W5	$453.00
West	
B3(2)	$463.00
C6	$453.00
South	
A7	$453.00
Alloy, East	
R3, C10	$492.00
B3	$492.00
Midwest	
W8, W5, C10	$492.00
U1	$492.00
R3	$492.00
S1	$459.00
West	
B3	$502.00
C6	$469.00
South	
A7	$492.00

Piling Sheet Steel

(cents per lb)

Midwest	
U1	26.45

Structurals

Carbon, East	
B3(2)	23.90
U1, J3	23.90
Midwest	
A7	24.15
C20	22.90
W8	22.90
I3, T10, U1, N4	23.90
West	
C6	25.10
U1	24.40
B3(2)	21.65
South	
C16, U1	23.90
T10	22.90
A8	Cmp*
High-Strength, Low Alloy, East	
B3(2)	23.90
U1, J3	23.90
Midwest	
N4	23.90
W8	24.15
U1	23.90
I3	23.90
West	
U1, A7	24.40
B3(2)	21.65
South	
U1, C16	23.90
Wide Flange, Carbon, East	
B3	23.90
U1, A7, J3	23.90
Midwest	
U1	23.90
N4	23.90
I3	23.90
West	
U1	24.40
C6	24.15
South	
A7	24.15

Strip

Hot-Rolled, Carbon, Cut ll Edge—all widths, East	
U1, B3	23.75
J3	22.05
Midwest	
A7, D1	22.05
I4	21.45
J3, D1	22.05
W3	22.05
N4	22.55
W5, S1	23.75
U1, B3	23.75
G2, I3, M2, R3, G3	22.05
West	
K1	20.80
B3	26.55
South	
R3	22.05
Cold-Rolled, Carbon Max. 25%, East	
E4	29.75
R7, S10	29.60
P15	24.80
S7	Cmp*
U1	38.30
D1(1)	Cmp*
B4	33.60
Midwest	
G4	24.80
I4	35.30
W14	22.95
S1, J4	34.05
T4	Cmp*
S1	37.05

*Composite pricing

High-Strength, Hot-Rolled, Low Alloy, Cut Edge & Mill Edge—all widths, (plus extras)*	
Midwest	
M2, G3, R3, W3, I4, J3, G2, I3	22.05
A7	22.05
S1	23.75
West	
K1	22.05
South	
R3	22.05
High-Strength, Cold-Rolled, Low Alloy, Mill Edge, East	
R7	29.00
Midwest	
S1	37.05
Alloy, Hot-Rolled, Midwest (plus extras)*	
S1	24.60
G4	25.80
I4	23.70
Alloy, Cold-Rolled, East	
C11, E4, M8	43.35
R7	32.75
B4	47.25
P15	32.10
Midwest	
I4	41.80
S1	42.30

Sheets

Hot-Rolled, Carbon (18 Ga & Hvyr), East	
B3	23.75
J3	22.05
U1	23.75
Midwest	
A7, G2, G3, I3, M2, R3, W3	22.05
D1	22.05
J3	22.05
I4	21.15
U1, W5, S1, B3	23.75
West	
U1	24.25
K1	22.05
South	
R3	22.05
Cold-Rolled, East, Class I	
B3(2)	26.15
J3	26.15
U1	26.15
Midwest	
I3, G3, R3, M2	26.15
G2, W3, M11	26.15
I4	22.00
J3, A7	26.15
D1	26.15
U1, W5, S1, B3	26.15
West	
U1	26.65
South	
R3	24.65
Galvanized (hot-dipped), East	
B3(2)	30.30
U1	30.30
Midwest	
J3, D1	28.00
I3,	28.00
A7, R3, Y1	28.00
G2, W3, M11	28.00
U1, W5, S1	30.30
West	
K1	27.15
U1	30.80
South	
R3	28.00
Enameling, Midwest	
U1, S1	29.85
A7, I3, J3	27.85
Long-Terne, Midwest	
W5	31.65
U1	31.65
R3, A7	29.35

†Actual weight basis

Wire Rod

East	
B3(2)	22.35
U1	22.35
Midwest	
N4	22.35
U1, K2	22.35
West	
A7	22.00
C6	21.45
South	
G7	22.35

Tinplate

	per base box
Electrolytic Tinplate	
Single Reduced (70 lb)	
East	
J3	$26.29
U1	27.74
B3	26.32
Midwest	
U1	$27.74
J3	26.29
M11	26.29
W3	26.29
W5	26.29
West	
K1	$26.79
U1	28.24
South	
U1	$27.74
Double Reduced (55 lb)**	
Midwest	
M11	$21.49
J3	21.49
U1	22.37
W3	21.49
W5	21.49
West	
K1	$21.99
U1	22.87
South	
U1	$22.37
Black Plate	
Single Reduced (75 lb)*	
East	
B3	$23.83
Midwest	
J3	$24.01
M11	24.01
I3, W5	24.01
W3	24.01
U1	25.26
West	
K1	$24.01
U1	25.26
Double Reduced (55 lb)	
East	
B3	$19.70
Midwest	
M11	$18.93
W5	18.93
J3	18.93
W3	18.93
W5	18.93
U1	19.70
West	
U1	$19.70
South	
U1	$19.70

*70 lb—base weight extra 45¢
**50 lb—base weight extra $1.40

Bars

Carbon Steel, Hot-Rolled (Special quality)	
East	
R3, K3	25.80
R5	25.80
B3(3), J3	25.80
U1, C10	25.80
Midwest	
A7	23.95
U1, I3, I4, C20, N4	25.80
R3, T10	25.80
K2	25.80
I3	19.50*
West	
B3	25.80
C6	24.45
South	
A8	20.65
A7	25.80
C16	25.80
Cold-Finished Carbon, East	
A11	22.15
R3	33.75
C21	21.15
J3(4), L2	31.00
C2	23.025
M8, W10, T11, S8	31.00
N1	24.475
R4	22.25
B4	31.00
M1	23.025
B4, C10	31.00
Midwest	
B5, W10, Y1, W8, R3, M9	33.25
J3	31.00
B1	19.80
L2	30.75
N9	31.00
P3	19.85 + CMS
W14	22.20
J3(3)	31.00
J3	31.00
West	
B5	34.90
R3	37.15
South	
B5	32.85
J3	34.00
C16	24.40
J3	31.95
Alloy, Hot-Rolled, East	
B3(2), R5, K3, C10, U1	27.95
R3	27.95
J3	27.95
Midwest	
A7, U1, R3	27.95
I3, C10	27.95
I4	24.85
I3	21.00*
West	
B3	27.95
B5	18.50
C6	26.80
South	
A7	24.85
A8	22.00
Alloy, Cold Drawn, East	
L2	35.20
R3, N1, C2	37.90
M1	28.025
R4	25.65
A11	30.50
J3, W10, L2	34.85
T11, S8	34.85
C10	34.85
J3(2)	34.25
Midwest	
R3, C10	37.35
C2	26.275
J3, W10	34.85
P3	22.75
B1	22.70
N9	34.85
L2	34.65
B5	37.10
J3	36.00
J3	34.85
M9	37.10
West	
R3	40.75
South	
J3	35.85
C16	28.00

Plates

Carbon Steel, East	
B3(2), U1	25.75
L4	25.75
P2	25.75
J3	26.75
Midwest	
B3, R3, S1	25.75
I3	24.25
J3, A7	22.80
U1, I4	25.75
R3	26.75
West	
A7, C6, O2	24.25
K1	23.50
U1, B3	25.75
South	
R3	25.75
A7	25.75
U1	25.75
Alloy, East	
B3, J3	33.55
U1, L4	33.55
P2	33.55
J3	34.55
Midwest	
B3	33.55
G2, G3	33.55
I4, U1	33.55
West	
B3	32.05
O2	30.55
K1	31.30
South	
A7	27.55
U1	33.55

Wire

Carbon Steel Wire, East	
B3(2)	27.10
U1	27.70
A11	22.15
Midwest	
U1	27.70
A7, R3	24.60
N4, W7	27.40
K2	24.20
South	
A8	22.85
West	
A7	25.95
C6	24.95

METALWORKING PRICE TRENDS

Price movements, although modest, continue upward

Producers prices in October supported the upward trend ongoing for most of the year. The Bureau of Labor Statistics' October figures were up 0.3 pct compared with the previous month.

However, the index for finished consumer goods other than foods and energy was unchanged in October, according to the government. The October index for passenger vehicles and light motor trucks turned up, reflecting price hikes for 1984 model year vehicles by domestic producers. There had been decline in September in that index because of end-of-model-year allowances and other incentives.

The October index for factory, construction and other capital equipment moved up 0.3 pct in price following a 0.3 pct drop in September.

Accounting for 22.5 pct of the producer price index, capital equipment prices are an important influence on the cost of doing business in the long run. An upturn is not good news for companies trying to expand to keep pace with economic recovery. But the BLS said the upturn resulted mainly from the increase in the index for motor vehicles as 1984 models were introduced. Prices also rose for aircraft and industrial process furnaces, but declined for railroad equipment.

A look at the figures for October shows that 11 price categories of the 22 listed on the table here went up. Metal cutting machine tools and cutting tools and accessories registered no change in October. Only four categories—metal forming machine tools, railroad equipment, bearings, and pumps, compressors and allied equipment—registered drops in October.

The 0.3 pct rise in the Producer Price Index is regarded by observers as an unusually modest showing for this stage of the country's post-recession recovery. In addition, there was stronger moderation in prices of goods further back along the production chain. This could mean there might not be the sharp rebound in prices at the wholesale level that has been predicted.

The finished goods price index in October moved up 1.3 pct from the year earlier period.

In a related development, the country's factories worked harder in October than at any time in the previous 25 months, using 78.9 pct of their capacity. Capacity utilization rates are regarded as an indicator of when to expand, modernize and hire.

Latest Month Covered: October, 1983

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	377.5	0	+ 1.4
Metal Forming Machine Tools	414.8	− 0.2	+ 1.0
Agricultural Machinery & Equip.	327.9	0	+ 3.3
Construction Machinery & Equip.	353.5	0	+ 1.7
Industrial Process Furnace & Ovens	366.7	+ 1.1	+ 2.9
Industrial Material Handling Equip.	286.2	+ 0.3	+ 0.2
Pumps, Compressors & Allied Equip.	345.1	− 0.2	− 0.9
Fluid Power Equip. (Dec. 1970 = 100)	254.0	+ 0.1	+ 2.5
Mechanical Power Transmission Equip.	315.7	0	+ 1.4
Automobiles	222.4	+ 6.9	+ 1.7
Motor Trucks—Light	282.8	+10.8	+ 3.2
Motor Trucks—Heavy	326.2	+ 8.3	+ 2.7
Railroad Equipment	355.4	− 0.6	+ 1.3
Fabricated Metal Structural Products	304.4	+ 0.2	− 0.5
Electric Motors	334.1	0	+ 6.9
Valves (Metal, Ex-Fluid Power—Dec. 1982=100)	100.1	+ 0.6	NA
Ball & Roller Bearings	322.0	− 0.1	− 1.0
Cutting Tools & Accessories	275.4	0	+ 1.3
Heating Equipment	245.0	+ 0.1	+ 2.8
Plumbing Fixtures & Brass Fittings	292.7	+ 0.4	+ 5.4
Metal Containers	338.3	0	+ 2.6
Miscellaneous Metal Products	288.2	+ 0.2	+ 1.4

Data based on U.S. Labor Dept.'s Producer Price Index